AN2240
Application note

Using the demonstration board for the TS472 low noise microphone preamplifier with 2 V bias

Introduction

This application note describes the STEVAL-CCA023V1 demonstration board, specifically designed to evaluate the TS472 microphone preamplifier.

The document provides information on:

- the layout of the demonstration board,
- the board's components.

About the TS472

The TS472 is an advanced microphone preamplifier solution, especially intended for mobile multimedia applications, with the following key features.

- Low noise: 10 nV/√Hz typ. equivalent input noise at F = 1 kHz
- Fully-differential input/output
- 2.2 to 5.5 V single supply operation
- Low power consumption at 20 dB: 1.8 mA
- Fast start-up time at 0 dB: 5 ms typ.
- Low distortion: 0.1% typ.
- 40 kHz bandwidth at -3 dB and adjustable gain
- Active low standby mode function (1 µA max)
- Low noise 2.0 V microphone bias output
- Available in flip-chip lead-free package and QFN24 4 x 4 mm
- ESD protection (2 kV)

Refer to the TS472 datasheet for complete device information.

1 Description of the demonstration board

The STEVAL-CCA023V1 is a demonstration board designed for the TS472 low noise microphone preamplifier with 2.0 V bias and active-low standby mode.

This demonstration board helps you to customize the conditions in which you conduct evaluation testing. Specifically, you can:

- set the adjustable gain of the TS472 device,
- use the TS472 built-in 2.0 V bias voltage to bias an electret microphone,
- or, externally bias the electret microphone.

1.1 Setting the adjustable gain

The gain of the TS472 is set by using the P5 connectors.

The connector has 7 jumper positions. By modifying the jumper positions, you can select any of the following gain values:

- -1.5 dB (minimum possible gain)
- 0 dB
- 10 dB
- 20 dB
- 30 dB
- 40 dB
- 41 dB (maximum possible gain)

Refer to *Table 1: Demonstration board connector description* to see how to place the jumper to obtain the desired gain value.

1.2 Output bias options

On the board, the R6, R7, R11 component locations are left empty to allow you to evaluate the TS472 in a typical application with an electret microphone biased by the TS472's built-in 2.0 V low noise bias output. To use the TS472's built-in biasing, the P6 connector must be closed and P7 must be left floating (refer to *Table 1: Demonstration board connector description*).

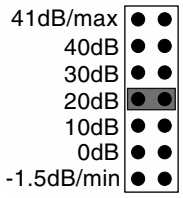
Alternatively, you can use the R10 empty component locations to externally bias the electret microphone. To do this:

1. connect the external bias voltage using the P7 connector.
2. leave the P6 connector open.
3. assemble the missing components.

2 Demonstration board connectors

Caution: When you apply the power supply through P3, **DO NOT** invert the polarity. Doing so will destroy the amplifier at U1.

Table 1. Demonstration board connector description

Connector	Description
P1	Input signal connector (GND, positive and negative input signal).
P2	Output signal connector (GND, positive and negative output signal).
P3	Power connector (V_{CC} and GND). Power supply voltage from 2.2 to 5.5 V.
P4	Standby control connector (V_{CC}, Standby, GND). A short-circuit between V_{CC} and Standby puts the TS472 in operating mode. A short-circuit between GND and Standby puts the TS472 in standby mode.
P5	 Selection connector for gain select pin. There are several possibilities for the value of the TS472 gain. The value of the gain is written directly on the PCB. For instance, to set the TS472 with a gain of 20 dB, the jumper must be placed as shown in the diagram.
P6	Internal microphone 2.0 V bias voltage connector. P7 must be floating.
P7	External microphone bias voltage connector (Vx and GND). P6 must be open.

3 Schematic diagram

Figure 1. Demonstration board schematic diagram

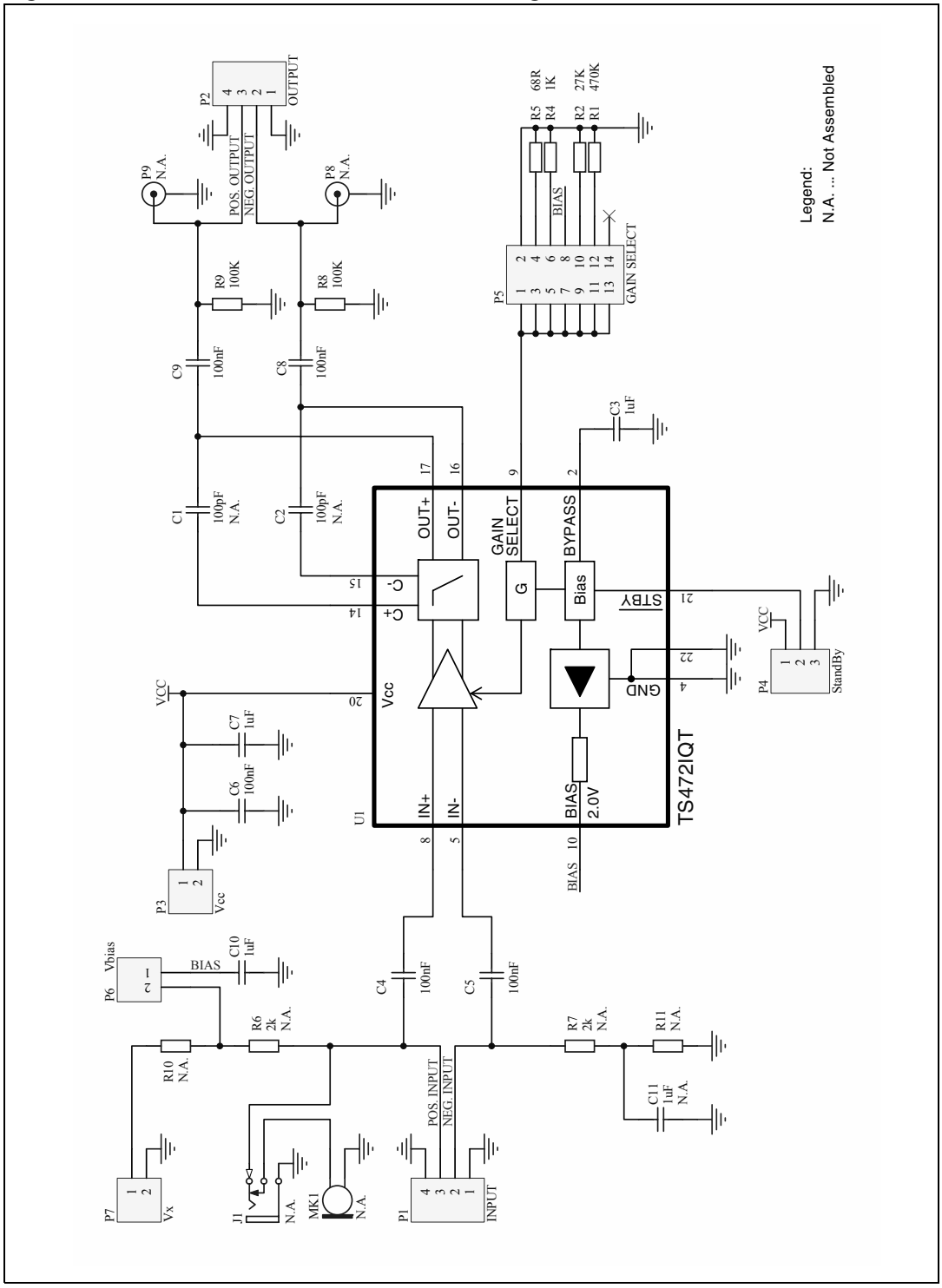


Table 2. Component list for the TS472 demonstration board

Board marking	Quantity	Description
C1, C2	0	Not assembled, 0805
C3, C7, C10	3	Capacitor 1 µF/10 V, 0805
C4, C5, C6, C8, C9	5	Capacitor 100 nF/50 V, 0805
C11	0	Not assembled, 0805
R1	1	Resistor 470 k/100 mW, 1%, 0805
R2	1	Resistor 27 k/100 mW, 1%, 0805
R4	1	Resistor 1 k/100 mW, 1%, 0805
R5	1	Resistor 68 R/100 mW, 1%, 0805
R6, R7, R10, R11	0	Not assembled, 0805
R8, R9	2	Resistor 100 k/100 mW, 1%, 0805
P1, P2	2	Vertical pin header 1x4, 2.54 mm pitch
P3, P6, P7	3	Vertical pin header 1x2, 2.54 mm pitch
P4	1	Vertical pin header 1x3, 2.54 mm pitch
P5	1	Vertical pin header 2x7, 2.54 mm pitch
U1	1	TS472IQT

4 Demonstration board layout

The following schematics show the different layers and top view of the demonstration board.

Figure 2. PCB top layer

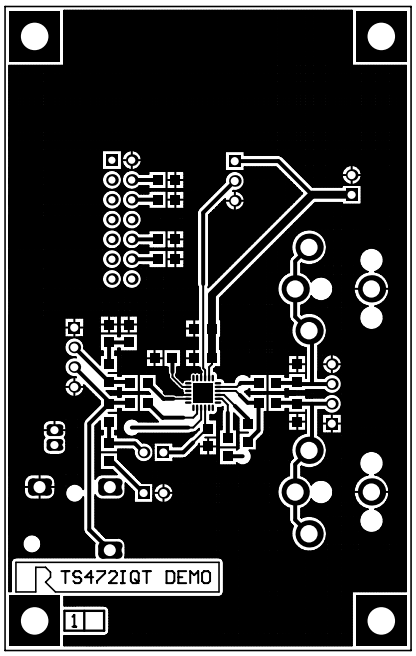


Figure 3. PCB bottom layer

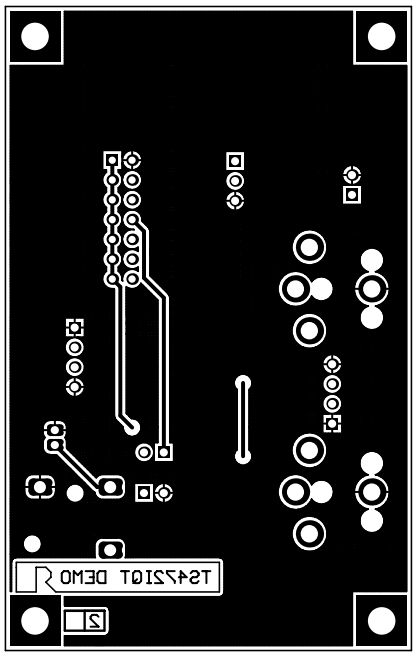
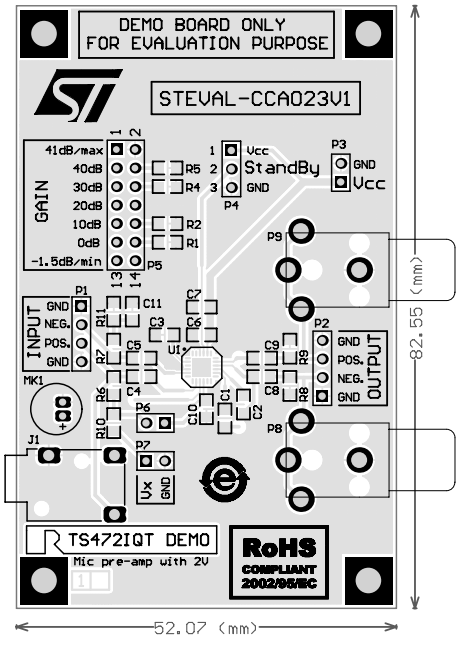


Figure 4. Top view of components layout



5 Conclusion

To order the board online, go to *http://www.st.com/stonline/domains/buy/buy_dev.htm*, and use the order code STEVAL-CCA023V1.

6 Revision history

Table 3. Document revision history

Date	Revision	Changes
13-Jul-2006	1	Initial release.
4-Aug-2006	2	Editorial updates. No technical changes.
6-Mar-2007	3	Added QFN package information.
26-Aug-2009	4	Changed PCB layouts in *Chapter 4*.

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